

# Nuclear Safety-Related Concrete Structures— Code Requirements and Commentary

Reported by ACI Committee 349

ACI CODE-349-23



American Concrete Institute  
*Always advancing*



## Nuclear Safety-Related Concrete Structures—Code Requirements and Commentary

Copyright by the American Concrete Institute, Farmington Hills, MI. All rights reserved. This material may not be reproduced or copied, in whole or part, in any printed, mechanical, electronic, film, or other distribution and storage media, without the written consent of ACI.

The technical committees responsible for ACI committee reports and standards strive to avoid ambiguities, omissions, and errors in these documents. Despite these efforts, the users of ACI documents occasionally find information or requirements that may be subject to more than one interpretation or may be incomplete or incorrect. Users who have suggestions for the improvement of ACI documents are requested to contact ACI via the errata website at <http://concrete.org/Publications/DocumentErrata.aspx>. Proper use of this document includes periodically checking for errata for the most up-to-date revisions.

ACI committee documents are intended for the use of individuals who are competent to evaluate the significance and limitations of its content and recommendations and who will accept responsibility for the application of the material it contains. Individuals who use this publication in any way assume all risk and accept total responsibility for the application and use of this information.

All information in this publication is provided “as is” without warranty of any kind, either express or implied, including but not limited to, the implied warranties of merchantability, fitness for a particular purpose or non-infringement.

ACI and its members disclaim liability for damages of any kind, including any special, indirect, incidental, or consequential damages, including without limitation, lost revenues or lost profits, which may result from the use of this publication.

It is the responsibility of the user of this document to establish health and safety practices appropriate to the specific circumstances involved with its use. ACI does not make any representations regarding health and safety issues and the use of this document. The user must determine the applicability of all regulatory limitations before applying the document and must comply with all applicable laws and regulations, including but not limited to, United States Occupational Safety and Health Administration (OSHA) health and safety standards.

Participation by governmental representatives in the work of the American Concrete Institute and in the development of Institute standards does not constitute governmental endorsement of ACI or the standards that it develops.

ACI documents are written via a consensus-based process. The characteristics of ACI technical committee operations include:

- (a) Open committee membership
- (b) Balance/lack of dominance
- (c) Coordination and harmonization of information
- (d) Transparency of committee activities to public
- (e) Consideration of views and objections
- (f) Resolution through consensus process

The technical committee documents of the American Concrete Institute represent the consensus of the committee and ACI. Technical committee members are individuals who volunteer their services to ACI and specific technical committees.

American Concrete Institute  
5880 Country Club Drive  
Farmington Hills, MI 48331  
Phone: +1.248.848.3700  
Fax: +1.248.848.3701

# Nuclear Safety-Related Concrete Structures— Code Requirements and Commentary

An ACI Standard

Reported by ACI Committee 349

Adeola K. Adediran, Chair  
Madhumita Sircar, Chair

Lisa M. Anderson, Secretary  
Carlos Cantarero-Leal, Secretary

Branko Colunovic, Vice Chair  
Partha Ghosal, Vice Chair  
John F. Silva, Vice Chair

Omesh B. Abhat  
Monzer M. Allam  
Taha D. Al-Shawaf  
Sungjin Bae  
Mi-Geum Chorzepa  
Rolf Eligehausen  
Werner A. F. Fuchs  
Stewart C. Gallocher

Herman L. Graves  
James A. Hammell  
Charles J. Hookham  
Thomas T. C. Hsu  
Ronald J. Janowiak  
Scott A. Jensen  
Christopher A. Jones  
Ola Jovall

Carl J. Larosche  
Nam-Ho Lee  
W. Calvin McCall  
Javeed Munshir  
Nebisa Orbovic\*  
James P. Pappas  
Frederick Scott  
Matthew R. Sherman

Bozidar Stojadinovic  
Amit H. Varma  
Shen Wang  
Andrew S. Whittaker  
Charles A. Zalesiak

## Consulting Members

Hansraj G. Ashar\*  
Peter J. Carrato

Ronald A. Cook  
Mukti L. Das

Orhan Gurbuz\*  
Dan J. Naus

Barendra K. Talukdar  
Albert Y. C. Wong

\*Deceased.

Note: ACI Committee 349 would like to thank O. Gurbuz and N. Orbovic for many years of membership to ACI Committee 349 and their hard work and dedication to this Code. Special acknowledgment is given G. Leon Flores, K. McBride, and J. Draper for their contributions to this Code.

*This Code covers the design and construction of concrete structures that form part of a nuclear facility and that have nuclear safety-related functions but does not cover concrete reactor vessels and concrete containment structures, as defined by ASME BPVC Section III Division 2:2019, or steel-plate composite walls and steel-plate composite slabs, as defined by ANSI/AISC N690.*

*The structures covered by this Code include concrete structures inside and outside the containment system.*

*This Code may be referenced and applied subject to agreement between the owner and the Regulatory Authority.*

*The format of this Code is such that it depends on the “Building Code Requirements for Structural Concrete (ACI CODE-318-14)” and should be used in conjunction with that Code. Unless otherwise stated, all instances of ACI 318 are referring to ACI CODE-318-14. When searching for subsections, tables, and figures in this Code, first refer to the main section of this Code to see if it is included and to find potential exceptions to the corresponding subsection, table or figure in ACI-318.*

*The Commentary, which is presented after the Code, discusses some of the considerations of ACI Committee 349 in developing “Code Requirements for Nuclear Safety-Related Concrete Structures (ACI 349).” This information is provided in the Commentary because the Code is written as a legal document and therefore cannot present background details or suggestions for carrying out its requirements.*

## CONTENTS

### CHAPTER 1—GENERAL, p. 5

- 1.1—Scope, p. 5
- 1.2—General, p. 5
- 1.3—Purpose, p. 6
- 1.4—Applicability, p. 6
- 1.5—Interpretation, p. 7
- 1.6—Authority having jurisdiction, p. 7
- 1.7—Licensed design professional, p. 7
- 1.8—Construction documents and design records, p. 7
- 1.10—Approval of special systems of design, construction, or alternative construction materials, p. 8

ACI CODE-349-23 supersedes ACI 349-13 and was approved by the ACI Standards Board for publication December 2023, and published October 2024. This Code was first published in 1976 and revised in 1980, 1997, 2001, 2006, and 2013.

Copyright © 2024, American Concrete Institute.

All rights reserved including rights of reproduction and use in any form or by any means, including the making of copies by any photo process, or by electronic or mechanical device, printed, written, or oral, or recording for sound or visual reproduction or for use in any knowledge or retrieval system or device, unless permission in writing is obtained from the copyright proprietors.